

SoundScape



Sound Sampler



ADDENDUM



mimeticsTM
corporation

...the Professional Software Source!!



SoundScape

The logo for SoundScape features the company name in a bold, black, handwritten-style font. Below the text is a graphic consisting of a light gray grid. Three vertical black lines of varying heights are positioned at different points along the grid, each topped with a series of horizontal black bars, resembling a sound waveform or a stylized city skyline.

mimeticsTM
corporation

COPYRIGHT

This manual Copyright © 1986, Mimetics Corporation, All Rights Reserved. This document may not, in whole or in part, be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine readable form without prior consent, in writing, from Mimetics Corporation.

All software described in this manual Copyright © 1986, Mimetics Corporation, All Rights Reserved. The distribution and sale of these products are intended for the use of the original purchaser only. Lawful users of these programs are hereby licensed only to read the programs, from their media into memory of a computer, solely for the purpose of executing the programs. Duplicating, copying, selling, or otherwise distributing these products is a violation of the law.

DISCLAIMER

MIMETICS CORPORATION MAKES NO WARRANTIES, EITHER EXPRESSED OR IMPLIED, WITH RESPECT TO THE PROGRAMS DESCRIBED HEREIN, THEIR QUALITY, PERFORMANCE, MERCHANTABILITY, OR FITNESS FOR ANY PARTICULAR PURPOSE. THESE PROGRAMS ARE SOLD "AS IS." THE ENTIRE RISK AS TO THEIR QUALITY AND PERFORMANCE IS WITH THE BUYER. SHOULD THE PROGRAMS PROVE DEFECTIVE FOLLOWING THEIR PURCHASE, THE BUYER (AND NOT THE CREATORS OF THE PROGRAMS, MIMETICS CORPORATION, THEIR DISTRIBUTORS, OR THEIR RETAILERS) ASSUMES THE ENTIRE COST OF INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECT IN THE PROGRAMS EVEN IF IT HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SOME LAWS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF IMPLIED WARRANTIES OR LIABILITIES FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY.

SoundScape is a trademark of Mimetics Corporation
Mimetics is a registered trademark of the Mimetics Corporation.
Amiga, Kickstart, and Workbench are a trademarks of Commodore-Amiga, Inc.
Commodore is a registered trademark of Commodore Electronics Limited.
Deluxe Video, Deluxe Music, and Instant Music are trademarks of Electronic Arts.

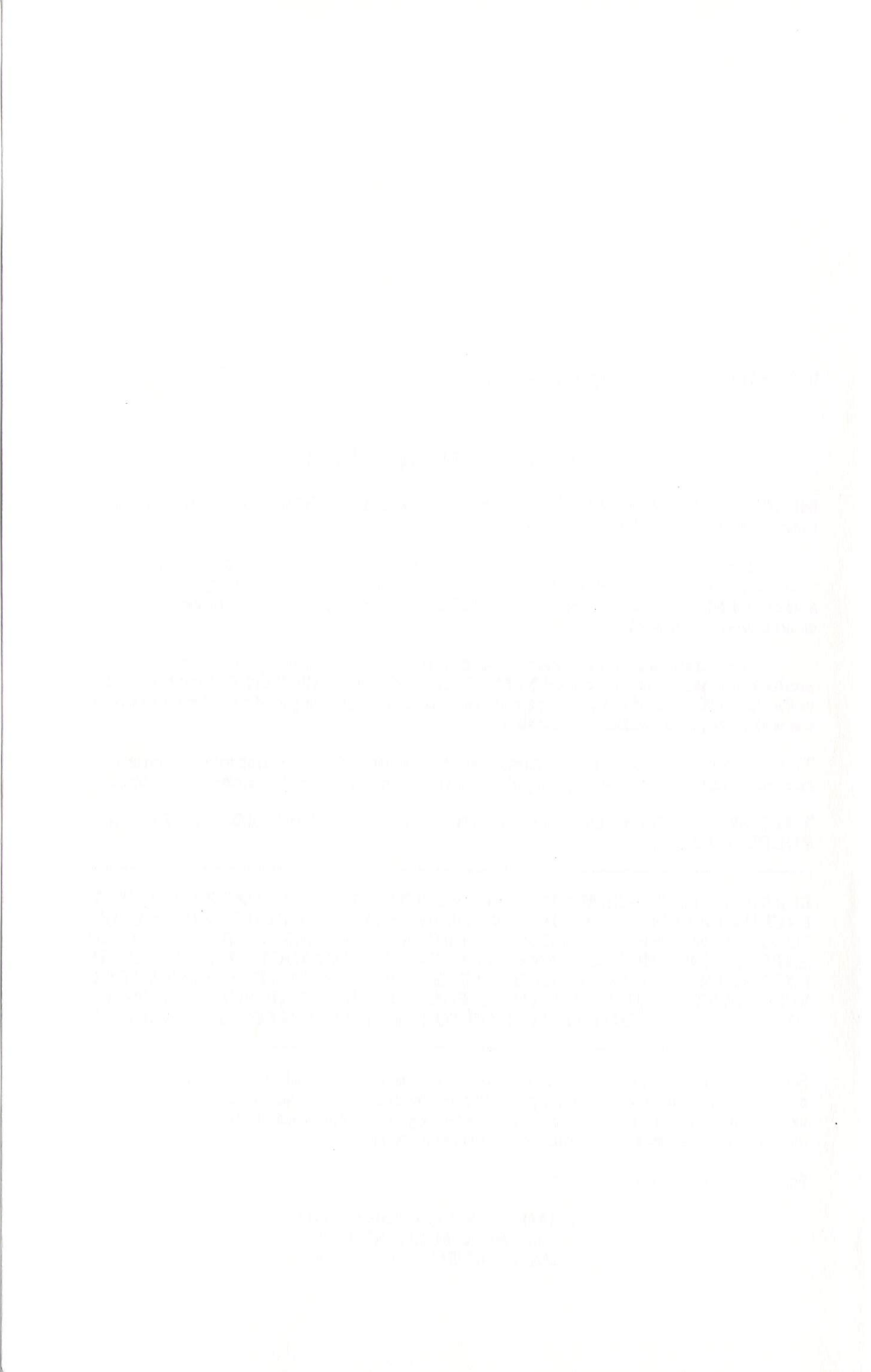


Table of Contents

1. How is This Document Organized?	1
2. Overview	2
3. Capturing A Sample	5
3.1 High/Low Sample Rate	5
3.2 Octave	5
3.3 Length	6
3.4 Seconds	6
3.5 Compressed/Non-compressed	7
3.6 Volume	7
3.7 Threshold	8
3.8 Recording	8
4. Editing a Sample	9
4.1 Viewing The Waveform	9
4.2 Scale & Position	10
4.3 Editing the Waveform	10
4.4 Start Playback Point and Loop Points	10
4.5 Truncate	11
4.6 Translating Octaves	11
4.7 Indicating What Octaves to Work with	12
4.8 Octave Translation	12
4.9 Simple Conversion	12
5. Files	13
5.1 Reading and Deleting Files	13
5.2 Saving Files	13
5.3 IFF versus Mimetics File Formats	14
6. Reference Section	15
6.1 Compression, Dynamics, and Amplitude Envelopes	15

SoundScape Sampler

6.2 Octaves 15

6.3 Recording 16

6.4 Sample Rates and Aliasing Distortion 16

7. Index 18

How is This Document Organized?

Simply:

Overview - This, the first section, is intended to shed some light on how to use the Sampler Software. The nuts and bolts that make it tick. This section doesn't have pictures, just ideas. The play-by-play stuff comes in the following sections.

Capturing A Sample - This section dwells on the options that can be used when recording a sample of sound. Actually, recording is really a rather simple process. All you need to do is click on the icon that looks like a microphone, click the left mouse button, and, when the screen turns yellow, click the button again. If you do that, and if the mike is hooked up right, you'll record something. So, since recording is that simple, this section focuses on the things that you can do to enhance the recording. Each icon used to record a sample is illustrated. Each is discussed. Moreover, they are presented in the order they would be used.

Editing A Sample - This section dwells on editing a sample of sound once you capture it. It is broken down into several subsections covering such topics as: creating octaves; editing the waveform; establishing loop points; and creating amplitude envelopes.

Files - This section is brief. It covers saving and retrieving files and file formats.

Reference Section - This addresses some of the more technical aspects of the Sampler software. The various topics appear in alphabetic order.

SoundScape Sampler

Overview

The sampler is a hardware device that plugs into the second mouse port of the Amiga computer. It can be used with a microphone or a line level source to digitize the sounds of a musical instrument, voice, or any other sound in a way that the can be played back later in any arrangement of harmony or cacophony.

The hardware device actually digitizes the sound, and the Sampler software captures it.

In its digitized form, the sound can be edited, manipulated, and stored in a file for use by SoundScape and other Amiga software.

There are a few options you can set to manipulate the recording process. And, of course, there are a few different ways of manipulating the sound after you capture it.

The options you can set for the recording process include:

- You can select a high or low sampling rate - how many thousands of times a second the Sampler reads the sound.
- You can manipulate the volume at which the sample is recorded. You can record in a compressed mode, which serves as an automatic gain control. Or you can record in noncompressed mode, and set the volume yourself.
- You can set a volume threshold, so that the Sampler does not begin recording until the source sound reaches a certain volume.
- You can set the length of the recording. The actual length of the recording is influenced by two factors. One is the amount of memory you allocate to the sample buffer. The other is the sampling rate you choose. A high sampling rate and a 65K buffer (the maximum) yields roughly a five second sample. A low sampling rate with the same size buffer yields a nine second recording.
- You can select which one of the 10 octaves you want to record into. The default is octave 5. After the sound is captured, it can be translated into other octaves.

After you select the recording options you want to use, the recording process does not begin until you click the microphone icon. Then the screen will

turn red. The screen remains red for about two seconds, then turns yellow, indicating it is ready to record. Now you have to click the left button on the mouse and recording will begin when one of two things happen: when the volume reaches the volume threshold, or when you click the left mouse button a second time. At this point, the screen turns green, indicating it is recording.

When the recording is complete, the Sample Capture & Edit screen displays the waveform of the sound. At this point there are a number of different things you can do to edit the sound.

- The first thing you may want to do is listen to the recording. If you recorded the sample into octave five, you can play it back by pressing Y on the Amiga keyboard. If you have recorded it into some other octave, you must press the key that corresponds to that octave. The sound can be played back at any time during the editing process. Remember, the sound does not exist in any octave other than the octave it was recorded into. It does not exist in any other octaves until it is converted using a octave translation procedure. More about that later.
- You can edit the sample's waveform by redrawing the waves. Using this graph, you can also set loop points so that the sound holds and repeats the parts you like.
- You can also convert the sound to additional octaves to fill the full range of the keyboard.
- Finally, last but not least, you can save your work in a file. This disk file can be in one of two formats. The Mimetics format, for use by the SoundScape software, or the IFF format, an interchange format that enables other software and games running on the Amiga computer to be able to use your samples.

Once a sound is recorded, it can be played back immediately. Simply press the keys associated with the octave you are working in. It can be played back at any time during editing.

SoundScape Sampler

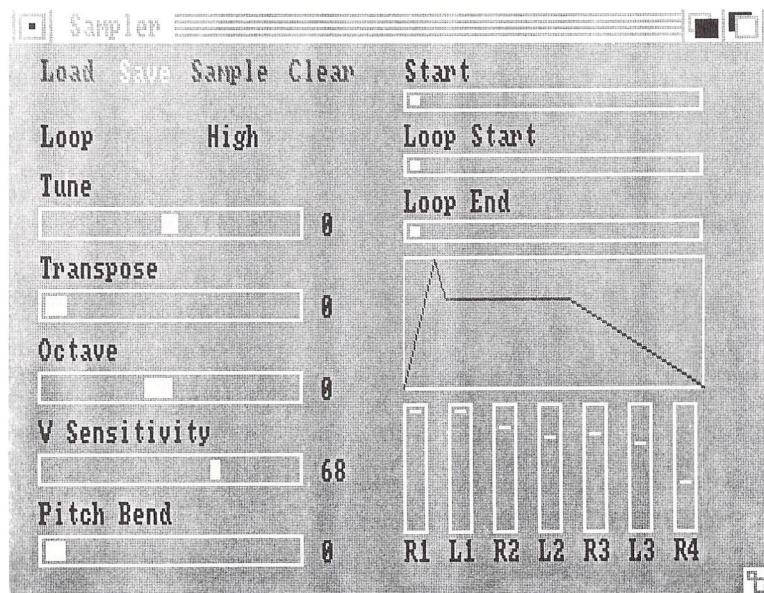


Fig 1. The Sampler window, the first window displayed.

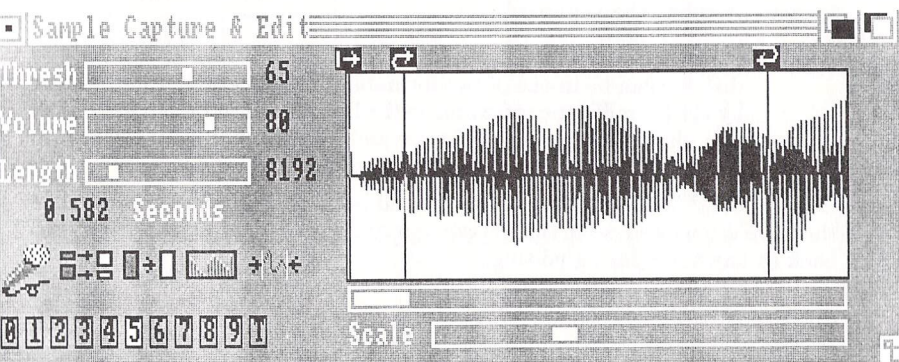


Fig 2. The Sample Capture & Edit window.

Capturing A Sample

This section covers the options available for the recording process. Each option is followed by discussion, and appears in the order it would be used.

The following icon appears on the window named Sampler. The remaining icons appear on the Sample Capture & Edit window. To enter the Sampler window, click on the Sampler icon.

High/Low Sample Rate

This icon appears on the Sampler window, the first window displayed.

Low

High

It sets the sample rate. Click on the icon and see how it toggles between low and high.

If you select High, the sound is recorded at 14,080 times a second, roughly 14 Khz.

If you select Low, the sound is recorded at 7,040 times a second, roughly 7 Khz.

The high sample rate yields the highest quality recording and a five second sample per 65K buffer. The low sample rate yields a nine second sample per 65K buffer.

The following icons appear on the Sample Capture & Edit window.

Octave

There are ten octaves. Select which octave you want to work with. The number of the octave you select appears in white. This is the active octave.



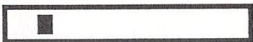
SoundScape Sampler

If you select octave five, you will be able to play the sample by pressing the keys Y through] or by hitting the caps-lock key and by playing Q through 8. Each octave is from A to G#. The console keyboard supports the upper half of octave four, all of octave five, and the lower half of octave six. These and all the other octaves are supported by MIDI.

If you are only using the console keyboard, you might consider always recording into octave 5, then copying your sample into the other octaves when you are done.

Length

This sets the length of the sample buffer. This buffer is used to capture the incoming sounds, and when it fills up, the recording is complete. The shorter the buffer, the shorter the sample. The buffer can be up to 65K in size.

Length 

Set the amount by sliding the box. If it refuses to allocate a large buffer, it means you are running low on memory. Shut down any small programs or windows you have running in the background. Or, use a smaller buffer.

Seconds

This indicates the duration in seconds the buffer can hold. This figure appears automatically.

0.582 Seconds

Two things affect the duration of a sample:

- High and low sample rates.
- The amount of memory allocated for the sample.

Compressed/Non-compressed

You can smooth out volume differentials from the source by recording in compressed mode. This cuts down the loud sounds, and brings up the quiet ones. It serves as an automatic gain control.

The symbol for Compressed is a straight line. The symbol for noncompressed is a mountain. Click on the symbol to see how it toggles between the two images.

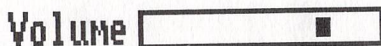


Recording in noncompressed mode lets you set the recording level yourself using the volume slider.

When you record in the compressed mode, the volume slider only sets the level for the start of recording.

Volume

This sets the recording level when you are recording in noncompressed mode.

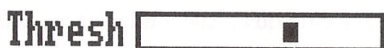


SoundScape Sampler

In compressed mode, this slider sets the initial recording level before recording starts.

Threshold

After you click on the microphone icon, the system waits for the source sound to reach a certain volume. Then it starts recording. This sets that threshold.



Recording

Ready, set to record ... click the microphone icon ...



After you click the mike, the screen turns red. It stays red for about two seconds, then turns yellow. At this point, click the left button of the mouse and recording will begin when one of two things happens: when the volume reaches the volume threshold, or when you click the left button of the mouse a second time.

When recording commences the screen turns green. When it finishes, the Sample Capture & Edit screen reappears, displaying the waveform of the sound just recorded.

If it does not enter the record mode, either the microphone is switched off, you have nothing plugged into the Sampler hardware, the Sampler is not properly installed, or the volume threshold is set too high. If you are waiting for a threshold, and you realize that the volume won't trigger the recording, no problem. Just click the mouse, let it record, reset the threshold, and do it again.

Editing a Sample

Once you have captured a sample, there are a number of things you can do to edit it. You can:

- View the waveform in its entirety or in any resolution down to individual cycles.
- Edit individual waves.
- Establish loop points so that the sound holds and repeats the parts you like.
- Cut the sample down in size so only the part that is played is retained.
- Translate the sample to other octaves.

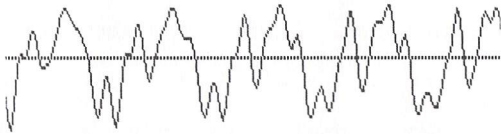
Viewing The Waveform

The waveform is an editable graphic representation of the sound sample. In this format, the sound can be viewed all at once or in pieces.

Viewed all at once, the sound can look like a silhouette of the Rocky Mountains.



SoundScape Sampler

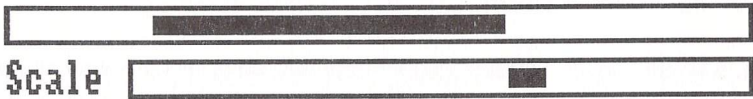


In medium resolution, it can look like the hills back home. In fine resolution, it looks like a fishing line amid cast.

Scale & Position

The scale slider indicates how much of the waveform to display. Setting the Scale all the way to the left gives you the finest resolution. Setting it all the way to the right gives you the whole thing.

The upper slider moves the display. Its size changes depending on the setting of the scale.



Editing the Waveform

With the scale all the way to the left, the individual cycles can be edited. Click on the left mouse button and draw the cursor across the lines. See how they change.

Start Playback Point and Loop Points

There are three icons above the waveform that look like arrows. These icons slide back and forth and mark the start playback point and the loop points.



To change a point, grab the icon and pull it into position. Once you let go, it is set.

The icon with the straight arrow indicates the start playback point. This is where the sample begins playing.

The two icons with the right and left arrows set the loop points. Looping does just that. It causes the sound to loop and hold until it fades out.

Unless the waveform is in fine resolution, the points are moved forward to the first downward zero crossing. This insures glitch free transitions. In fine resolution, they stay where you put them.

Truncate

After you finish editing and are satisfied with the sample, click the truncate icon. This economizes on the amount of memory consumed by the sample. The sound before the start playback point and after the loop end point is deleted, and that freed memory is returned to the system.



Translating Octaves

You can create up to ten octaves from the same sample of sound by converting the sample up and down to the other octaves.

There are two ways to convert a sound from one octave to another. One actually changes the sound into that fitting the octave you select. The other way simply copies it without making any changes.

SoundScape Sampler

Indicating What Octaves to Work with

Look at octave numbers. One is red. One is white. Red converts to white. Red is always the last octave you worked on, white is the current one.



If you were to click the conversion icons right now, the sound in the octave with the red number would be converted into the octave with the white number. Click the octave numbers, and see how the colors change. Now that you know how to indicate the direction of a translation, you are ready to select a type of conversion. Read on.

(By the way, the T indicates a temporary buffer, which can be used to copy an octave to or from another channel.)

Octave Translation

This converts the sound to the octave you choose. For example, if you translate from octave five to octave four, you would get the same sound, just one octave lower. Or, if you were to translate from octave three to octave eight, you get a sound five octaves higher, while leaving octaves four through seven alone.



Simple Conversion

This simply copies the sound without changing it in any way.



Files

Reading and Deleting Files

From the Sampler window click the Load command, and a new window will appear with a list of the sample files in the SoundScape directory. At this point you can select a file, delete a file, quit, or select another directory.



There is a slider to the right of the file names. It will let you view more file names, should there be more in the directory than can be displayed at one time.

Click twice on the name of the file you want.

If you want to look in another directory, edit the name of the directory. It defaults to "SoundScape:".

Saving Files



SoundScape Sampler

When you click the Save command, you can save your work in a file, or simply quit and return to the Sampler window. To save the file, you must type its name and then hit the return key.

IFF versus Mimetics File Formats

The Mimetics file format should be used at all times. Use the IFF format only if you are creating sounds to be used by other programs that support the IFF file format.

Not all the data about a sound is saved in the IFF file format. Performance information is thrown away. In addition, IFF assumes that the same sample is used in all ten octaves, or however many you have filled with samples. This is fine if you recorded one sound, set its loop points, then translated it up and down to the other octaves. However, if you have various length samples and loop points, you might not be happy with the results.

The IFF format assumes that the sample has one size, which is halved as you go up octaves and multiplied by two as you go down. The sample can have one loop start point and one loop end point. When a file is converted to IFF format from Mimetics format, the loop points and length of the top octave are used to determine the values for the remaining octaves.

Multiple sampling is possible if you follow the rule that each octave should be half the size of the previous sample. The best way to create additional octaves is to use the option that translates one octave into another. This will create octaves that are exactly multiples of two. After you create the additional octaves, set the loop points for all ten octaves at once. Use the Sampler window to set the loop points rather than doing it individually while editing each samples. This way, they'll line up, as the IFF format wants.

Reference Section

This section addresses some of the more technical aspects of the Sampler software. The topics appear in alphabetic order.

Compression, Dynamics, and Amplitude Envelopes

Along with making the recording process a bit easier, compression can actually improve sound quality.

During the recording process, compression maintains a constant signal to noise ratio of 8 bits, or 48 db, which is just about full volume.

But while compression records the sound with a constant high signal to noise ratio, it levels out the dynamics, the fluctuations in volume.

But it's nice for strings to start quiet and then get loud, and for pianos to have a sharp attack, and to decay to a soft tone. Although compression levels out these dynamics, they can be reimposed with an amplitude envelope. The amplitude envelope provides an additional 6 bits of volume control that is used in addition to the 8 bit sample, providing a sound with 14 bits of range.

Experiment. Put percussive envelopes on strings, or slow attacks on drums.

Without compression, the recording can retain the dynamics of the original sound. Only the peak levels of the sound are recorded at full volume, the rest will be less.

Octaves

There are ten octaves to work with. Each octave is assigned a sample. When the note A is played, the sample plays back at the same rate it was recorded. All other notes in the octave, on up to G#, are created by playing the sample back at progressively higher speeds (the chipmunk effect.) The octave A is, of course, the next octave sample played at the original rate.

You may find that it is not necessary to record a sound into all ten octaves. Octaves 2 and 3 are usually enough for a bass, for example. So, you could put the bass on 2 and 3, a guitar on 4 and 5, and various sound effects on 6, 7, and 8. Or, you can put an entire ten piece drum kit together, one drum for each octave. Now, each type of sound is not only accessible, but can be tuned over an octave range. Remember, there is no law that says

SoundScape Sampler

low octaves have to have low samples. If you favor your left hand, you can put the bass on octaves 8 and 9, and the piccolo on octaves 2, 3, and 4.

Each octave is from A to G#. The console keyboard supports the upper half of octave four, all of octave five, and the lower half of octave six. These and all the other octaves are supported by MIDI.

Recording

When the screen is red, the sampler volume level is being set. If the mode is noncompressed, the sampler hardware is given a specific level. If the mode is compressed, the level is determined by both the volume and the incoming signal. In this case, a volume of 10 and a very loud signal sets the recording level very low. A volume of 99 and a quiet signal sets a high recording level.

Sample Rates and Aliasing Distortion

There is a difference in the quality of sample recorded at the high and at the low sample rates. The high recording rate of 14080 Hz yields the highest quality sample. The low recording rate of 7040 Hz can produce aliasing distortion.

Why the difference in quality between high and low sample rates?

When a sampled sound is played, the sample rate combines with the sample to produce the original signal (which we want) plus an additional signal that is the sampling frequency minus the original signal's frequency. This is called aliasing distortion. For example, if a 4khz tone is played at the sample rate of 15 khz, the reproduced signal will have two tones - one at 4 khz, the second at 11 khz. To deal with this, the Amiga's sound producing circuitry has an output filter that effectively cuts off all signals above 7 khz. So, the tone of our example would be played back while the annoying 11 khz is removed by the filter.

By recording and playing back at a sample rate that is at least twice the filter cutoff frequency, we guarantee that no aliasing produced tones can make it through. The high sample rate, 14080 hz, does just that. The sound is recorded by the sampler at 14080 hz. The playback software treats this as the bottom of the octave, though, so the other notes of the octave are played back at progressively higher rates, reaching 26579 hz for G#.

At the low sample rate, 7040 hz, aliasing is a problem. For example, a 2 khz signal will result in two tones, one at 2 khz, the second at 5 khz.

Additional Notes

To get a better feel for what is going on, try this:

Set the sample rate to low and record a whistle that bends down in pitch. When played back, you should hear a metallic tone that moves up in pitch while the original whistle moves down. Play a higher note (A is the bottom of the octave). The alias tone will also be higher and might possibly disappear. Play G#. The tone should be just about gone since a sample rate of 13290 hz is used for G#.

Aliasing distortion is a two ended problem. It occurs both at recording and playback time. The sampler has a filter built in to deal with this. However, we should still have additional problems at the low rate, because the aliasing distortion should slip under the filter and end up being recorded in with the sample. The sampler avoids this by always recording at 14080 hz. At the low sample rate, the signal is run through a software filter that halves the data rate, while avoiding folding the sample rate and accompanying distortion into the data.

By the way, the sampling rate of 14080 hz is no magic number. It is A440 times 32, which is a standard for Amiga programs that generate musical sound. All other notes of the octave are obtained by playing back at progressively higher rates.

SoundScape Sampler

Index

aliasing distortion 16
amplitude envelope 15
chipmunk effect 15
compression 7, 15
console keyboard 6
directory 13
finest resolution 10
IFF 14
length 6
Load 13
loop points 10
MIDI 6
octave 5, 11, 15
recording 8
recording level 7
sample buffer 6
sample rate 5, 16
Save 14
scale 10
seconds 6
temporary buffer 12
threshold 8
truncate 11
waveform 9
zero crossing 11

Mimetics SoundScape Sampler

LIMITED WARRANTY

MIMETICS CORPORATION ("MIMETICS") warrants this product against defects in material or workmanship, as follows:

For a period of ninety days from the date of the first retail purchase, MIMETICS shall at its sole and absolute option either repair or replace at no charge through your authorized MIMETICS Dealer or MIMETICS itself the defective unit with the same model or an equivalent model.

To obtain warranty service, the customer shall take the product or deliver the product prepaid, to an authorized MIMETICS Dealer or to MIMETICS. Proof of purchase in the form of a bill of sale, receipted invoice, or other positive proof that the unit is within the warranty period must be presented.

This warranty does not cover claims for damage due to abuse, improper maintenance, connection an improper voltage supply, misuse, alteration of serial numbers, or accident.

THIS WARRANTY IS VALID ONLY IN THE UNITED STATES AND PUERTO RICO.

REPAIR OR REPLACEMENT, AS PROVIDED UNDER THIS WARRANTY, IS THE EXCLUSIVE REMEDY OF THE CONSUMER. MIMETICS SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ON THIS PRODUCT. EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, ANY IMPLIED WARRANTY ON MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ON THIS PRODUCT IS LIMITED IN DURATION TO THE DURATION OF THIS WARRANTY.

Some states do not allow the exclusion or limitation of incidental or consequential damages, or allow limitations on how long an implied warranty lasts, so the above limitations or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

For further information contact:

MIMETICS CORPORATION
P.O. BOX 60238 STA. A
PALO ALTO, CA 94306



